General

Guideline Title

Low back disorders.

Bibliographic Source(s)

Low back disorders. In: Hegmann KT, editor(s). Occupational medicine practice guidelines. Evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2011. p. 333-796. [1137 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Low back disorders. Occupational medicine practice guidelines: evaluation and management of common health problems and functional recovery in workers. 2nd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2007. 366 p.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- March 22, 2016 – Opioid pain medicines : The U.S. Food and Drug Administration (FDA) is warning about several safety issues with the entire class of opioid pain medicines. These safety risks are potentially harmful interactions with numerous other medications, problems with the adrenal glands, and decreased sex hormone levels. They are requiring changes to the labels of all opioid drugs to warn about these risks.

Recommendations

Major Recommendations

Definitions for the strength of evidence ratings (A, B, C, and I) and the criteria for evidence-based recommendations are presented at the end of the "Major Recommendations" field.

General Summary of Recommendations

The following is a general summary of the recommendations:

- The initial assessment of patients with low back problems focuses on detecting indications of potentially serious disease, termed "red flags" (i.e., fever or major trauma).
- In the absence of red flags, imaging and other tests are not recommended in the first 4 to 6 weeks of low back symptoms as they almost never result in a meaningful change in clinical management. Nonprescription medication or an appropriately selected nonsteroidal anti-inflammatory drug (NSAID), appropriate adjustment of physical activity if needed, and the use of thermal modalities such as heat and/or cryotherapies can safely relieve discomfort.
- In the absence of red flags, primary care and occupational physicians or other health care professionals can effectively manage low back problems conservatively.
- At the first visit, the physician should assure the patient that low back pain (LBP) is normal, has an excellent prognosis and, in most cases, is not debilitating on a long-term basis. Patients with elevated fear avoidance beliefs may require additional instructions and interventions to be reassured of this prognosis. Theoretically, this reassurance has the potential to avoid increasing the probability of the patient developing chronic pain syndrome.
- To avoid undue back irritation and debilitation from inactivity, some activity or job modification may be helpful in the acute period. However, bed rest is not recommended for essentially all LBP and radiculopathy patients other than those with unstable fractures or cauda equina syndrome with pending neurological catastrophe. Maintaining ordinary activity, as tolerated, leads to the most rapid recovery.
- All patients should be encouraged to return to work as soon as possible as evidence suggests this leads to the best outcomes. This process may be facilitated with modified duty particularly if job demands exceed patient capabilities. Full-duty work is a reasonable option for patients with low physical job demands and the ability to control such demands (e.g., alternate their posture) as well as for those with less severe presentations.
- Aerobic exercise has the best evidence of efficacy among the exercise regimens, whether for acute, subacute, or chronic LBP patients.
- Non-specific stretching is not recommended as it is not helpful for treatment of LBP. However, specific types of stretching exercises appear helpful (e.g., directional and slump stretching). Strengthening exercises, including lumbar stabilization exercises, are recommended, but not until the acute period of LBP has subsided.
- There is evidence of efficacy for manipulation for treatment of non-specific LBP, particularly for those patients who test positive for the Clinical Prediction Rule.
- Many invasive and noninvasive therapies are intended to cure or manage LBP, but no strong evidence exists that they accomplish this as successfully as therapies that focus on restoring functional ability without focusing on pain. In those cases, the traditional medical model of "curing" the patient does not work well. Furthermore, patients should be aware that returning to normal activities most often aids functional recovery.
- Patients should be encouraged to accept responsibility for managing their recovery rather than expecting the provider to provide an easy "cure." This process will promote using activity rather than pain as a guide, and it will make the treatment goal of return to occupational and non-occupational activities more obvious.
- If symptoms persist without improvement, further evaluation is recommended.
- Within the first 3 months of low back symptoms, only patients with evidence of severe spinal disease or severe debilitating symptoms and physiologic evidence of specific nerve root compromise confirmed by appropriate imaging studies can be expected to potentially benefit from surgery.
- Quality evidence exists indicating that patient outcomes are not adversely affected by delaying surgery for weeks or a few months and continued conservative care is encouraged in patients with stable or improving deficits who desire to avoid surgery. However, patients with severe or progressive deficits that are not improving at 4 to 6 weeks may benefit from earlier surgical intervention.
- Nonphysical factors (such as psychiatric, psychosocial, workplace, or socioeconomic problems) should be investigated and addressed in cases of delayed recovery or delayed return to work.
- Physicians can greatly improve patient response to back symptoms by providing assurance, encouraging activity, and emphasizing that more than 90% of LBP complaints resolve without any specific therapies. While patients may be looking for a clear-cut diagnosis for their LBP, the risk to them of a suggested "cure" for this assumed diagnosis, resulting in failed expectations, may be worse than their symptoms.
- Physicians should be aware that "abnormal" findings on x-rays, magnetic resonance images, and other diagnostic tests are so common they *are normal* by age 40. Bulging discs continue to increase after age 40, and by age 60 will be encountered in 80% of patients. This requires that a careful history and physical examination be conducted by a skilled physician in order to correlate historical, clinical, and imaging findings prior to assigning the finding on imaging to a patient's complaints. It is recommended that physicians unable to make those correlations, and thus properly educate patients about these complex issues, should defer ordering imaging studies to a qualified consultant in musculoskeletal disorders. Without proper education on prevalence, treatment, and prognosis, patients may become fixated on "fixing" their abnormality (which may in fact be a completely normal condition) and thus iatrogenically increase their risk of developing chronic pain.

- Significant abnormalities in hip range-of-motion may increase the probability of back disorders.

Summary Tables: Recommendations and Evidence

Table 1 is a summary of the recommendations from the Evidence-based Practice Spine Panel for diagnostic testing for low back disorders. Table 2 is a summary of recommendations for managing these disorders. Table 3 is a summary of recommendations for the prevention of low back disorders. Table 4 is a summary of recommendations for post-operative low back pain. The recommendations are based on critically appraised higher quality research evidence and on expert consensus observing First Principles when higher quality evidence was unavailable or inconsistent. The reader is cautioned to utilize the more detailed indications, specific appropriate diagnoses, temporal sequencing, prior testing or treatment, and contraindications that are elaborated in more detail for each test or treatment in the body of this Guideline in using these recommendations in clinical practice or medical management. These recommendations are not simple "yes/no" criteria, and the evidence supporting them was in nearly all circumstances developed from typical patients, and not unusual situations or exceptions. Note that the phrase "there are no quality trials" is contained throughout this document and refers to a lack of high- or moderate-quality trials for that particular intervention or test. Recommendations for those topics are consensus of the panel.

Recommendations are made under the following categories:

- Strongly Recommended, "A" Level
- Moderately Recommended, "B" Level
- Recommended, "C" Level
- Insufficient – Recommended (Consensus-based), "I" Level
- Insufficient – No Recommendation (Consensus-based), "I" Level
- Insufficient – Not Recommended (Consensus-based), "I" Level
- Not Recommended, "C" Level
- Moderately Not Recommended, "B" Level
- Strongly Not Recommended, "A" Level

Table 1: Summary of Recommendations for Diagnostic and Other Testing for Low Back Disorders

Test	Recommendation(s)
X-ray	Routine x-ray for acute, non-specific LBP – Not Recommended, Evidence (C) X-ray for acute LBP with red flags for fracture or serious systemic illness, subacute LBP that is not improving, or chronic LBP as an option to rule out other possible conditions – Recommended, Insufficient Evidence (I) Flexion and extension views for evaluating symptomatic spondylolisthesis in which there is consideration for surgery or other invasive treatment or occasionally in the setting of trauma – Recommended, Insufficient Evidence (I)
Magnetic Resonance Imaging (MRI)	MRI for patients with acute LBP during the first 6 weeks if they have demonstrated progressive neurologic deficit, cauda equina syndrome, significant trauma with no improvement in atypical symptoms, a history of neoplasia (cancer), or atypical presentation (e.g., clinical picture suggests multiple nerve root involvement) – Recommended, Insufficient Evidence (I) MRI is not recommended for acute radicular pain syndromes in the first 6 weeks unless they are severe and not trending towards improvement and both the patient and the surgeon are willing to consider prompt surgical treatment, assuming the MRI confirms ongoing nerve root compression. Repeat MRI without significant clinical deterioration in symptoms and/or signs is also not recommended. – Not Recommended, Evidence (C) MRI is recommended for patients with subacute or chronic radicular pain syndromes lasting at least 4 to 6 weeks in whom the symptoms are not trending towards improvement if both the patient and surgeon are considering prompt surgical treatment, assuming the MRI confirms ongoing nerve root compression. In cases where an epidural glucocorticosteroid injection is being considered for temporary relief of acute or subacute radiculopathy, MRI at 3 to 4 weeks (before the epidural steroid injection) may be reasonable. – Moderately Recommended, Evidence (B) MRI is recommended as an option for the evaluation of select chronic LBP patients in order to rule out concurrent pathology unrelated to injury. This option should not be considered before 3 months and only after other treatment modalities (including NSAIDs, aerobic exercise, other exercise, and considerations for manipulation and acupuncture)

Test	Recommendation(s)
	have failed. – Recommended, Insufficient Evidence (I)
	Standing or weight-bearing MRI for any back or radicular pain syndrome or condition – Not Recommended, Insufficient Evidence (I)
Computerized Tomography (CT)	Routine CT for acute, subacute, or chronic non-specific LBP, or for radicular pain syndromes – Not Recommended, Insufficient Evidence (I) CT for patients with acute or subacute radicular pain syndrome that has failed to improve within 4 to 6 weeks and there is consideration for an epidural glucocorticoid injection or surgical discectomy – Recommended, Evidence (C)
Myelography	Myelography, including CT myelography, for uncommon specific situations – Recommended, Insufficient Evidence (I)
Bone Scans	Bone scanning for routine use in diagnosing LBP – Not Recommended, Insufficient Evidence (I)
Single Proton Emission Computed Tomography (SPECT)	SPECT for the evaluation of patients with low back pain and related disorders – Not Recommended, Insufficient Evidence (I)
Electromyography (EMG)	Electrodiagnostic studies, which must include needle EMG, are recommended where a CT or MRI is equivocal and there are ongoing pain complaints that raise questions about whether there may be a neurological compromise that may be identifiable (i.e., leg symptoms consistent with radiculopathy, spinal stenosis, peripheral neuropathy, etc.) – Recommended, Evidence (C) Electrodiagnostic studies for patients with acute, subacute, or chronic back pain who do not have significant leg pain or numbness – Not Recommended, Evidence (C)
Surface Electromyography	Surface EMG to diagnose LBP – Not Recommended, Insufficient Evidence (I)
Ultrasound	Diagnostic ultrasound for diagnosing LBP – Not Recommended, Insufficient Evidence (I)
Thermography	Thermography for diagnosing acute, subacute, or chronic LBP, or radicular pain – Not Recommended, Insufficient Evidence (I)
Fluoroscopy	Fluoroscopy for evaluating acute, subacute, or chronic LBP – Not Recommended, Insufficient Evidence (I)
Videofluoroscopy	Videofluoroscopy for the assessment of acute, subacute, or chronic LBP – Not Recommended, Insufficient Evidence (I)
Lumbar Discography	Discography, whether performed as a solitary test or when paired with imaging (e.g., MRI), for acute, subacute, chronic LBP or radicular pain syndromes – Moderately Not Recommended, Evidence (B)
MRI Discography	MRI discography for evaluating herniated discs – Not Recommended, Evidence (C)
Myeloscopy	Myeloscopy for diagnosing acute, subacute or chronic LBP, spinal stenosis, radicular pain syndromes, or postsurgical back pain problems – Not Recommended, Insufficient Evidence (I)
Functional Capacity Evaluations (FCEs)	FCEs are an option for chronic stable LBP or completed post-operative recovery when a physician thinks the information may be helpful to attempt to objectify worker capability vis-à-vis either a specific job or general job requirements – No Recommendation, Insufficient Evidence (I) FCEs for evaluation of acute LBP, acute or subacute radicular syndromes, or post-surgical back pain problems within

Test	Recommendation(s)
	the first 12 weeks of the post-operative period – Not Recommended, Insufficient Evidence (I)

Table 2: Summary of Recommendations by Low Back Disorder

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
Acute Low Back Pain	Alteration of sleep posture (I) Aerobic exercise (B) Specific stretching exercises (C) Strengthening exercises (C) Inclusion of fear avoidance belief training during the course of rehabilitation (I) Nonsteroidal anti-inflammatory drugs (NSAIDs) (A) Proton pump inhibitors (A) Misoprostol (A) Sucralfate (B) Histamine-2 (H2) blockers (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have risks and benefits of NSAID therapy for pain discussed. (I) Acetaminophen or aspirin as first-line therapy appear to be the safest to use for these patients. (A) Acetaminophen for low back pain (LBP) with or without radicular symptoms, particularly for those with contraindications for NSAIDs (C) Limited use of opioids for severe acute LBP without radicular pain (C) Screening by asking about prior substance abuse with tools (e.g., CAGE for alcohol assessment) and using currently available screening tools designed for use in populations on or considering opioid therapy as patients with prior history of drug or alcohol abuse or psychological problems are at increased risk of developing opioid-related use/abuse problems. Psychological evaluation in most cases. (I) Use of a treatment agreement to document patient understanding and agreement with expectations of opioid use (I)	Yoga (I) Thiocolchicoside (I) Harpagoside, Camphora molmol, Melaleuca alternifolia, Angelica sinensis, Aloe vera, Thymus officinalis, Mentha piperita, Arnica Montana, Curcuma longa, Tancaetum parthenium, and Zingiber officinale (I) Topical NSAIDs or other creams and ointments (I) Mattresses (I) Use of optimal sleeping surfaces (e.g., bedding, water beds, and hammocks) (I) Physical or occupational therapy (I) Home use of infrared therapy (I) Ultrasound – in situations where deeper heating is desirable, a limited trial is reasonable for acute LBP but only if performed as an adjunct with exercise (I) Interferential therapy – it may be an option for limited use for acute LBP with or without radicular pain (I) Neuroreflexotherapy (I) Botulinum injections (I)	Bed rest (A) Specific beds or other commercial sleep products (I) Aggressive stretching (I) Abdominal strengthening exercises as a sole or central goal of a strengthening program (I) Aquatic therapy (I) Lumbar extension machines (I) Antidepressants (I) Oral and intravenous (IV) colchicine (I) Routine use of opioids (C) Muscle relaxants for mild to moderate acute LBP (I) Glucocorticosteroids (B) Tumor necrosis factor-α inhibitors (I) Complementary or alternative treatments or dietary supplements, etc. (other than those specifically described in chapter) (I) Willow bark (salix) (I) Spiroflor (I) Vitamins (I)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	Routine use of urine drug screening for patients on opioids (I) Muscle relaxants as a second-line treatment in moderate to severe acute LBP not adequately controlled by NSAIDs (B) Capsaicin (capsicum) (B) Massage (I) Manipulation or mobilization for select acute LBP based on Clinical Prediction Rule (B) Manipulation or mobilization for acute LBP without Clinical Prediction Rule (C) Self-applications of low-tech cryotherapies (I) Self-application of heat therapy, including a heat wrap (C) Provider-based infrared therapy in conjunction with an active exercise program with frequency not to exceed 4 visits (I) Work conditioning and work hardening programs (I) Fear avoidance belief training, particularly if there are any suggestions of fear avoidance belief issues (B)		Shoe insoles and lifts (I) Lumbar supports (C) Kinesiotaping and taping (I) Magnets (I) Mechanical devices for administering massage (C) Reflexology (I) Myofascial release (I) Traction (C) Decompression through traction and spinal decompressive devices (I) Adjustments or manipulations of the neck/cervical spine or other areas outside of the lumbopelvic region (I) Manipulation under anesthesia (MUA) and medication-assisted spinal manipulation (MASM) (I) Routine use of cryotherapies in health care provider offices or home use of a high-tech device (I) Diathermy (C) Low-level laser therapy (I) Transcutaneous electrical nerve stimulation (TENS) (I) Percutaneous electrical nerve stimulation (PENS) (I) Microcurrent electrical stimulation (I)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		H-wave stimulation (I)
	Recommended	No Recommendation	High-voltage galvanic (I)
			Iontophoresis (I) Routine use of acupuncture (I) Epidural glucocorticosteroid injections for acute LBP in the absence of significant radicular symptoms (C) Clonidine for all other LBP not responsive to rehabilitative therapy, NSAIDs or glucocorticosteroids (I) Intradiscal steroid injections (I) Trigger and/or tender point injections (I) Diagnostic facet joint injections (I) Therapeutic facet joint injections (I) Prolotherapy injections (C) Sacroiliac joint injections for acute LBP including LBP thought to be sacroiliac joint related (I) Radiofrequency neurotomy, neurotomy, and facet rhizotomy (C) Intradiscal electrothermal therapy (IDET) (I) Percutaneous intradiscal radiofrequency thermocoagulation (A)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			Discectomy for acute LBP without radiculopathy (B) Percutaneous discectomy (nucleoplasty), laser discectomy, and disc coblation therapy (I) Adhesiolysis (I) Spinal cord stimulators (I) Chronic pain management/functional restoration programs (I) Cognitive behavioral therapy (I) Biofeedback (I) Back schools or education (I)
Subacute Low Back Pain	Alteration of sleep posture (I) Aerobic exercise (B) Specific stretching exercises (C) Strengthening exercises (C) Inclusion of fear avoidance belief training during the course of rehabilitation (I) Trial of aquatic therapy for patients who meet criteria (I) NSAIDs (B) Proton pump inhibitors (A) Misoprostol (A) Sucralfate (B) H2 blockers (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have the risks and benefits of NSAID therapy for pain discussed. (I) Acetaminophen or aspirin as the first-line therapy appear to be the safest to use for these patients. (A) Acetaminophen for LBP with or without radicular symptoms, particularly for those with	Yoga (I) Thiocolchicoside (I) Harpagoside, Camphora molmol, Melaleuca alternifolia, Angelica sinensis, Aloe vera, Thymus officinalis, Mentha piperita, Arnica Montana, Curcuma longa, Tancaetum parthenium, and Zingiber officinale (I) Topical NSAIDs or other creams and ointments (I) Mattresses (I) Use of optimal sleeping surfaces (e.g., bedding, water beds, and hammocks) (I) Physical or occupational therapy (I) Home use of infrared therapy (I) Ultrasound (I) Neuroreflexotherapy (I) Botulinum injections (I)	Bed rest (B) Specific beds or other commercial sleep products (I) Aggressive stretching (I) Abdominal strengthening exercises as a sole or central goal of a strengthening program (I) Aquatic therapy for all other subacute LBP (I) Lumbar extension machines (I) Antidepressants (I) Oral and IV colchicine (I) Routine use of opioids (C) Muscle relaxants for

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	contraindications for NSAIDs (C) Capsaicin (capsicum) (B) Massage for select use as an adjunct to more efficacious treatments consisting primarily of a graded aerobic and strengthening exercise program (C) Manipulation or mobilization for subacute LBP without Clinical Prediction Rule (C) Self-applications of low-tech cryotherapies (I) Self-application of heat therapy, including a heat wrap (C) Trigger and/or tender point injections may be reasonable as second or tertiary options for subacute LBP that is not resolving (C) Chronic pain management/functional restoration programs can be used with caution in the late subacute phase if their cost can be justified based on early development of major psychosocial barriers to recovery such as opioid dependence, severe post-operative complications, severe mood disorders, or complicating co-morbid conditions (I) Work conditioning and work hardening programs (I) Participatory ergonomics programs, where available, for highly select patients with subacute LBP who remain off work or on a different job and where there is managerial support and interest (C) Cognitive behavioral therapy as a component of a formal interdisciplinary program when combined with other indicated therapies with parameters described in the Rehabilitation for Delayed Recovery section (C) Fear avoidance belief training, particularly if there are any suggestions of fear avoidance belief issues (B) A multidisciplinary rehabilitation program with a participatory ergonomics team for patients with subacute LBP with lost-time injuries (C)		chronic use in subacute LBP (I) Glucocorticosteroids (I) Tumor necrosis factor-α inhibitors (I) Complementary or alternative treatments or dietary supplements, etc. (other than those specifically described in chapter) (I) Willow bark (salix) (I) Spiroflor (I) Vitamins (I) Shoe insoles and lifts other than in circumstances of leg length discrepancy over 2cm (I) Lumbar supports (C) Kinesiotaping and taping (I) Magnets (I) Mechanical devices for administering massage (C) Reflexology (I) Myofascial release (I) Traction (C) Decompression through traction and spinal decompressive devices (I) Adjustments or manipulations of the neck/cervical spine or other areas outside of the lumbopelvic region (I) Manipulation under anesthesia (MUA) and medication-

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			assisted spinal manipulation (MASM) (I) Routine use of cryotherapies in health care provider offices or home use of a high-tech device (I) Diathermy (C) Provider-based infrared therapy (I) Low-level laser therapy (I) Interferential therapy (C) TENS (I) PENS (I) Microcurrent electrical stimulation (I) H-wave stimulation (I) High-voltage galvanic (I) Iontophoresis (I) Routine use of acupuncture (I) Epidural glucocorticosteroid injections for subacute LBP in the absence of significant radicular symptoms (C) Clonidine for all other LBP not responsive to rehabilitative therapy, NSAIDs or glucocorticosteroids (I) Intradiscal steroid injections (B) Glucocorticosteroids for use in trigger point injections (C) Diagnostic facet joint

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			injections (I) Therapeutic facet joint injections (I) Prolotherapy injections (C) Sacroiliac joint injections for subacute nonspecific LBP, including pain attributed to the sacroiliac joints, but without evidence of inflammatory sacroiliitis (rheumatologic disease) (I) Radiofrequency neurotomy, neurotomy, and facet rhizotomy (C) IDET (I) Percutaneous intradiscal radiofrequency thermocoagulation (A) Discectomy for subacute LBP without radiculopathy (B) Percutaneous discectomy (nucleoplasty), laser discectomy, and disc coblation therapy (I) Adhesiolysis (I) Spinal cord stimulators (I) Biofeedback (I) A multidisciplinary rehabilitation program with a primary focus on interventions addressing LBP (I)
Chronic Low Back Pain	Alteration of sleep posture (I) Aerobic exercise (B) Aerobic exercise for chronic persistent pain	Duloxetine (I) Thiocolchicoside (I) Harpagoside, Camphora molmol, Melaleuca	Bed rest (B) Specific beds or other commercial sleep

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	(A) Specific stretching exercises (C) Strengthening exercises (C) Inclusion of fear avoidance belief training during the course of rehabilitation (I) A trial of aquatic therapy for patients who meet the criteria (I) Yoga for select, highly motivated patients with LBP lasting more than a year (C) NSAIDs (B) Proton pump inhibitors (A) Misoprostol (A) Sucralfate (B) H2 blockers (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have the risks and benefits of NSAID therapy for pain discussed. (I) Acetaminophen or aspirin as the first-line therapy appear to be the safest to use for these patients. (A) Acetaminophen for LBP with or without radicular symptoms, particularly for those with contraindications for NSAIDs (C) Norepinephrine reuptake inhibitor antidepressants (e.g., amitriptyline, imipramine, nortriptyline, maprotiline, doxepin) (A) Topiramate for limited use in select patients with chronic LBP as a fourth- or fifth-line agent (C) Gabapentin for peri-operative management of pain to reduce need for opioids, particularly in patients with side effects from opioids (A) Lidocaine patches (I) A trial of opioid therapy for chronic severe back or leg pain may be recommended and may be required by specific intractable pain acts (I) Screening by asking about prior substance abuse with simple tools such as the CAGE for alcohol assessment and using currently available screening tools designed for use in populations on or considering opioid therapy is recommended as there is evidence that patients	alternifolia, Angelica sinensis, Aloe vera, Thymus officinalis, Mentha piperita, Arnica Montana, Curcuma longa, Tancaetum parthenium, and Zingiber officinale (I) Topical NSAIDs or other creams and ointments (I) Mattresses (I) Use of optimal sleeping surfaces (e.g., bedding, water beds, and hammocks) (I) Physical or occupational therapy (I) Home use of infrared therapy (I) Ultrasound (I) Epidural clonidine (I) One diagnostic facet joint injection may be recommended for patients with chronic LBP that is significantly exacerbated by extension and rotation or associated with lumbar rigidity and not alleviated with other conservative treatments (e.g., NSAIDs, aerobic exercise, other exercise, manipulation) in order to determine whether specific interventions targeting the facet joint are recommended. Repeated diagnostic injections in the same location(s) are not recommended. (I) Therapeutic facet joint injections for flare ups of chronic low back pain (I) Botulinum injections (I) Radiofrequency neurotomy, neurotomy, or facet rhizotomy for patients with chronic LBP confirmed with diagnostic blocks, but who do not have radiculopathy and who have failed conservative treatment (I)	products (I) Aggressive stretching (I) Stretching exercises for chronic persistent low back pain. (I) In select cases, stretching exercises may be added for self-treatment if needed. Abdominal strengthening exercises as a sole or central goal of a strengthening program (I) Aquatic therapy for all other chronic LBP (I) Lumbar extension machines (I) Selective serotonin reuptake inhibitors (e.g., paroxetine, bupropion, trazodone) (A) Anti-convulsants (except topiramate) for chronic persistent low back pain (nonradicular) (I) Gabapentin or pregabalin for chronic nonneuropathic pain or LBP (C) Bisphosphonates (I) Calcitonin (I) Oral and IV colchicine (I) Ketamine infusion (I) Ketanserin (I) N-methyl d-aspartate (NMDA) receptor/antagonists, including dextromethorphan (I)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	with a prior history of drug or alcohol abuse or psychological problems are at increased risk of developing opioid related use/abuse problems. A psychological evaluation would also be recommended in most cases. (I) Use of a treatment agreement to document patient understanding and agreement with the expectations of opioid use (I) Routine use of urine drug screening for patients on opioids (I) Muscle relaxants as second- or third-line agents for acute exacerbations of chronic pain (I) Capsaicin (capsicum) for temporary flare-ups of chronic LBP (B) Shoe lifts among individuals with significant leg length discrepancy >2 cm (I) Shoe insoles for patients with chronic LBP with prolonged walking requirements (C) Massage for select use as an adjunct to more efficacious treatments consisting primarily of a graded aerobic and strengthening exercise program (C) Manipulation or mobilization of the cervical and/or thoracic spine for short-term relief of chronic pain or as a component of an active treatment program focusing on active exercises for acute exacerbations (B) Self-applications of low-tech cryotherapies (I) Self-applications of heat therapy, including a heat wrap (C) TENS for select use as an adjunct for more efficacious treatments (C) Acupuncture for select use in chronic moderate to severe low back pain as an adjunct to more efficacious treatments (C) Neuroreflexotherapy for moderate to severe chronic LBP in patients who have failed management with NSAIDs, progressive aerobic exercise program or other exercises, or manipulation (C) Trigger and/or tender point injections may be reasonable as second or tertiary options for chronic LBP not resolving (C) Chronic pain management/functional		Routine use of opioids (C) Muscle relaxants for chronic use in chronic LBP (other than acute exacerbations) (I) Glucocorticosteroids for chronic LBP without radicular pain (I) Thalidomide (I) Tumor necrosis factor-α inhibitors (I) Complementary or alternative treatments or dietary supplements, etc. (other than those specifically described in chapter) (I) Willow bark (salix) (I) Lumbar supports (C) Hyperbaric oxygen (I) Topical hyperbaric oxygen (I) Spiroflor (I) Dimethyl sulfoxide (DMSO) (I) N-acetylcysteine (NAC) (I) Eutectic mixture of local anesthetics (EMLA) cream (I) Wheatgrass cream (I) Vitamins (I) Shoe insoles and lifts other than in circumstances of leg length discrepancy over 2 cm (I) Kinesiotaping and taping (I) Magnets (I)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
	restoration programs for chronic spinal pain, particularly those programs that focus on functional outcomes (I) Work conditioning, work hardening, and early intervention programs (C) Participatory ergonomics programs, where available, for highly select patients with chronic LBP who remain off work or on a different job and where there is managerial support and interest (C) Back schools or education for select patients (B) Cognitive behavioral therapy as a component of a formal interdisciplinary program when combined with other indicated therapies with parameters described in the Rehabilitation for Delayed Recovery section (C) Psychological evaluation as part of the evaluation and management of patients with chronic pain in order to assess whether psychological factors will need to be considered and treated as part of the overall treatment plan (I) Psychological evaluation prior to consideration of back surgery in patients with chronic benign pain (I) Fear avoidance belief training, particularly if there are any suggestions of fear avoidance belief issues (B) Biofeedback for select patients with chronic LBP as a component (not a separate procedure) of cognitive behavioral therapy (CBT) or as a procedure in the context of an interdisciplinary or functional rehabilitation program (I) Multidisciplinary or interdisciplinary program rehabilitation program (IPRP) with a focus on cognitive behavioral, occupational, and activity-based approaches combined with aerobic exercise and other conditioning exercise for patients with chronic LBP who are not working due to LBP (C) A multidisciplinary rehabilitation program with participatory ergonomics team for chronic LBP patients with lost-time injuries (C)		Mechanical devices for administering massage (C) Reflexology (C) Myofascial release (I) Traction (C) Decompression through traction and spinal decompressive devices (I) Regular or routine manipulation or mobilization (several times a month for years) (I) Adjustments or manipulations of the neck/cervical spine or other areas outside of the lumbopelvic region (I) MUA and MASM (I) Routine use of cryotherapies in health care provider offices or home use of a high-tech device (I) Application of heat (such as infrared, moist heat, whirlpool) by a health care provider (I) Diathermy (C) Provider-based infrared therapy (I) Low-level laser therapy (I) Interferential therapy (C) PENS outside of research settings for chronic non-radicular LBP (I) Microcurrent electrical stimulation (I)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		H-wave stimulation (I)
	Recommended	No Recommendation	High-voltage galvanic (I)
			Iontophoresis (I) Epidural glucocorticosteroid injections for chronic LBP in the absence of significant radicular symptoms (C) Intradiscal steroid injections (B) Glucocorticosteroids for use in trigger point injections (C) Therapeutic facet joint injections for chronic LBP (I) Therapeutic facet joint injections for routine treatment of chronic non-specific axial pain (B) Repeat use of intra-articular therapeutic facet joint injections for patients who have failed to achieve lasting functional improvements with a prior injection (B) Intrathecal drug delivery systems (I) Prolotherapy injections (C) Sacroiliac joint injections for chronic nonspecific LBP, including pain attributed to the sacroiliac joints, but without evidence of inflammatory sacroiliitis (rheumatologic disease) (I) Radiofrequency

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			neurotomy, neurotomy, and facet rhizotomy (C) IDET (I) Percutaneous intradiscal radiofrequency thermocoagulation for chronic LBP, particularly including discogenic LBP (A) Discectomy for chronic LBP without radiculopathy (B) Percutaneous discectomy (nucleoplasty), laser discectomy, and disc coblation therapy (I) Adhesiolysis (I) Lumbar fusion for patients with chronic LBP after lumbar discectomy (C) Lumbar fusion for chronic non-specific LBP (B) Artificial disc replacement for chronic nonspecific LBP (I) Sacroiliac joint fusion surgery and other sacroiliac joint surgical procedures (I) Spinal cord stimulators (I) A multidisciplinary rehabilitation program with a primary focus on interventions addressing LBP (I)
Radicular Pain Syndromes (including	NSAIDs (C) Proton pump inhibitors (A)	Gabapentin for chronic radicular pain syndromes. A trial may be considered as a third- or fourth-line treatment (after NSAIDs,	Bed rest (C) Lumbar extension machines (I)

"sciatica")	Misoprostol (A)	exercise, tricyclic antidepressants [TCAs])	Topiramate for
Low Back Disorder	Treatment with Evidence Rating/Recommendation Level	and patients should be carefully evaluated for	neuropathic pain,
	Sucralfate (B) Recommended	No Recommendation improvement within a few weeks prior to	Not Recommended including peripheral
	H2 blockers (C)	further treatment. (I)	neuropathy (I)
	Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have the risks and benefits of NSAID therapy for pain discussed. (I) Acetaminophen or aspirin as the first-line therapy appear to be the safest to use for these patients. (A)	Interferential therapy – it may be an option for limited use for acute LBP with or without radicular pain (I)	Glucocorticosteroids for mild to moderate radiculopathy (I)
	Acetaminophen for LBP with or without radicular symptoms, particularly for those with contraindications for NSAIDs (C)	Neuroreflexotherapy (I)	Tumor necrosis factor-α inhibitors (C)
	Norepinephrine reuptake inhibitor antidepressants (TCAs) (C)	Botulinum injections (I)	Vitamins (I)
	Carbamazepine as a potential adjunct as a fourth- or fifth-line treatment for chronic radicular or neuropathic pain after attempting other treatments (e.g., different NSAIDs, aerobic exercise, other exercise, manipulation) (I)		Shoe insoles and lifts other than in circumstances of leg length discrepancy over 2 cm (I)
	Gabapentin for severe neurogenic claudication with limited walking distance (C)		Kinesiotaping and taping (I)
	Muscle relaxants as second- or third-line agents for acute radicular pain syndromes (I)		Magnets (I)
	Glucocorticosteroids for acute severe radicular pain syndromes (C)		Mechanical devices for administering massage (C)
	Massage for chronic radicular syndromes in which LBP is a substantial symptom component (I)		Reflexology (I)
	TENS for select use in chronic radicular pain syndrome as an adjunct for more efficacious treatments (C)		Myofascial release (I)
	An epidural glucocorticosteroid injection is an option for acute or subacute radicular pain syndromes (I)		Traction (C)
	Lumbar discectomy to speed recovery in patients with radiculopathy due to ongoing nerve root compression who continue to have significant pain and functional limitation after 4 to 6 weeks of time and appropriate conservative therapy (B)		Decompression through traction and spinal decompressive devices (I)
	For third lumbar discectomy on same disc, spinal fusion at time of discectomy is an option (I)		Manipulation for radicular pain syndromes with acute neurological deficits (I)
			Adjustments or manipulations of the neck/cervical spine or other areas outside of the lumbopelvic region (I)
			Diathermy (C)
			Interferential therapy for chronic radicular pain syndromes (C)
			TENS for acute

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			radicular pain syndromes (I) PENS (I) Microcurrent electrical stimulation (I) H-wave stimulation (I) High-voltage galvanic (I) Iontophoresis (I) Routine use of acupuncture (I) Clonidine for all other LBP not responsive to rehabilitative therapy, NSAIDs or glucocorticosteroids (I) Diagnostic facet joint injections (I) Therapeutic facet joint injections (I) Prolotherapy injections (C) Sacroiliac joint injections (I) Radiofrequency neurotomy, neurotomy, and facet rhizotomy (C) Radiofrequency lesioning of the dorsal root ganglia for chronic sciatica (B) IDET (I) Percutaneous discectomy (nucleoplasty), laser discectomy, and disc coblation therapy (I) Adhesiolysis (I) Lumbar fusion for patients with radiculopathy from disc herniation (C)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			Artificial disc replacement (I) Sacroiliac joint fusion surgery and other sacroiliac joint surgical procedures (I) Spinal cord stimulators (I)
Spinal Stenosis	Gabapentin for severe neurogenic claudication with limited walking distance (C) Epidural glucocorticosteroid injections are an option as a second-line treatment for acute flare-ups (I) Decompression surgery for patients with symptomatic spinal stenosis (neurogenic claudication) that is intractable to conservative management (B)	Botulinum injections (I)	Bed rest (I) Kinesiotaping and taping (I) Magnets (I) Reflexology (I) Myofascial release (I) Diathermy (C) Interferential therapy (C) High-voltage galvanic (I) Iontophoresis (I) Clonidine for all other LBP not responsive to rehabilitative therapy, NSAIDs or glucocorticosteroids (I) Radiofrequency neurotomy, neurotomy, and facet rhizotomy (C) IDET (I) Adhesiolysis (I) Lumbar fusion unless concomitant instability has been proven (C) Artificial disc replacement (I)
Spinal Fractures	Bed rest for unstable spinal fractures (I)	Botulinum injections (I) Vertebroplasty for highly select patients with low back or thoracic pain due to unusual	Bed rest for stable spinal fractures (I) Kinesiotaping and

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
		vertebral compression fractures (I) Kyphoplasty for patients with low back or thoracic pain due to vertebral compression fractures (I)	taping (I) Magnets (I) Reflexology (I) Myofascial release (I) Diathermy (C) Interferential therapy (C) High-voltage galvanic (I) Iontophoresis (I) Vertebroplasty as a routine treatment for patients with low back or thoracic pain due to vertebral compression fractures (A)
Sacroiliitis	Sacroiliac joint corticosteroid injections as an option for patients with a specific known cause of sacroiliitis, i.e., proven rheumatologic inflammatory arthritis involving sacroiliac joints (C)	Botulinum injections (I)	Bed rest (I) Kinesiotaping and taping (I) Magnets (I) Reflexology (I) Myofascial release (I) Diathermy (C) Interferential therapy (C) High-voltage galvanic (I) Iontophoresis (I) Clonidine for all other LBP not responsive to rehabilitative therapy, NSAIDs or glucocorticosteroids (I) Sacroiliac joint fusion surgery and other sacroiliac joint surgical procedures (I)
Spondylolisthesis	Lumbar fusion for isthmic spondylolisthesis (C) Lumbar fusion for degenerative spondylolisthesis (C)	Botulinum injections (I)	Bed rest (I) Kinesiotaping and taping (I)

Low Back Disorder	Treatment with Evidence Rating/Recommendation Level		
	Recommended	No Recommendation	Not Recommended
			Magnets (I) Reflexology (I) Myofascial release (I) Diathermy (C) Interferential therapy (C) High-voltage galvanic (I) Iontophoresis (I) Clonidine for all other LBP not responsive to rehabilitative therapy, NSAIDs or glucocorticosteroids (I)
Facet Degenerative Joint Disease			Facet joint injections with hyaluronic acid (I)

Table 3. Summary of Recommendations for Prevention of Low Back Disorders

Recommended	Not Recommended
Strengthening exercises (C) Smoking cessation programs (I) Weight loss programs (I)	Stretching exercise as an isolated prescription or program (C) Abdominal strengthening exercises as a sole or central goal of a strengthening program (I) Shoe insoles and lifts (C) Lumbar supports (C) Back schools or education (C)

Table 4. Summary of Recommendations for Post-Operative Low Back Pain

Recommended	Not Recommended
Aerobic exercise (I) Strengthening exercises (C) Inclusion of fear avoidance belief training during course of rehabilitation (I) NSAIDs (B) Proton pump inhibitors (A) Misoprostol (A) Sucralfate (B)	Abdominal strengthening exercises as a sole or central goal of a strengthening program (I) Vitamins (I)

Recommended	Not Recommended
H2 blockers (C) Patients with known cardiovascular disease or multiple risk factors for cardiovascular disease should have the risks and benefits of NSAID therapy for pain discussed. (I) Acetaminophen or aspirin as first-line therapy appear to be the safest to use for these patients. (A) Acetaminophen for LBP with or without radicular symptoms, particularly for those with contraindications for NSAIDs (C) Limited use of opioids as adjunctive therapy to more effective treatments (C) Screening of patients by asking about prior substance abuse with tools such as CAGE for alcohol assessment and using currently available screening tools designed for use in populations on or considering opioid therapy is recommended as there is evidence that patients with a prior history of drug or alcohol abuse or psychological problems are at increased risk of developing opioid related use/abuse problems. A psychological evaluation would also be recommended in most cases (I) Use of a treatment agreement to document patient understanding and agreement with the expectations of opioid use (I) Routine use of urine drug screening for patients on opioids (I) Muscle relaxants as second- or third-line agents for acute post-surgical situations (I)	

Definitions:

Strength of Evidence Ratings

A = Strong evidence-base: Two or more high-quality studies.*

B = Moderate evidence-base: At least one high-quality study or multiple moderate-quality studies** relevant to the topic and the working population.

C = Limited evidence-base: At least one study of moderate quality.

I = Insufficient evidence: Evidence is insufficient or irreconcilable.

*For therapy and prevention, randomized controlled trials (RCTs) or crossover trials with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross sectional studies using independent gold standards. For prognosis, etiology or harms, prospective cohort studies with minimal heterogeneity.

**For therapy and prevention, well-conducted cohort studies. For prognosis, etiology or harms, well-conducted retrospective cohort studies or untreated control arms of RCTs.

Strength of Recommendations

Recommendation	Evidence Rating	Description of Category
Strongly Recommended	A	The intervention is strongly recommended for appropriate patients. The intervention improves important health and functional outcomes based on high quality evidence, and the Evidence-Based Practice Panel (EBPP) concludes that benefits substantially outweigh harms and costs.
Moderately Recommended	B	The intervention is recommended for appropriate patients. The intervention improves important health and functional outcomes based on intermediate quality evidence that benefits substantially outweigh harms and costs.
Recommended	C	The intervention is recommended for appropriate patients. There is limited evidence that the intervention may improve important health and functional benefits.
Insufficient -	I	The intervention is recommended for appropriate patients and has nominal costs and essentially no potential

Recommendation	Evidence Rating	Description of Category
Recommended (Consensus-based)		for harm. The EBPP feels that the intervention constitutes best medical practice to acquire or provide information in order to best diagnose and treat a health condition and restore function in an expeditious manner. The EBPP believes based on the body of evidence, first principles, or collective experience that patients are best served by these practices, although the evidence is insufficient for an evidence-based recommendation.
Insufficient - No Recommendation (Consensus-based)	I	The evidence is insufficient to recommend for or against routinely providing the intervention. The EBPP makes no recommendation. Evidence that the intervention is effective is lacking, of poor quality, or conflicting and the balance of benefits, harms, and costs cannot be determined.
Insufficient - Not Recommended (Consensus-based)	I	The evidence is insufficient for an evidence-based recommendation. The intervention is not recommended for appropriate patients because of high costs or high potential for harm to the patient.
Not Recommended	C	Recommendation against routinely providing the intervention. The EBPP found at least intermediate evidence that harms and costs exceed benefits based on limited evidence.
Moderately Not Recommended	B	Recommendation against routinely providing the intervention to eligible patients. The EBPP found at least intermediate evidence that the intervention is ineffective, or that harms or costs outweigh benefits.
Strongly Not Recommended	A	Strong recommendation against providing the intervention to eligible patients. The EBPP found high quality evidence that the intervention is ineffective, or that harms or costs outweigh benefits.

Clinical Algorithm(s)

The following clinical algorithms are provided in the original guideline document:

- Master Low Back Algorithm: ACOEM Guidelines for Low Back Pain
- Initial Evaluation of Acute and Subacute Low Back and Radicular Pain
- Initial and Follow-up Management of Acute and Subacute Low Back and Radicular Pain
- Evaluation of Subacute, Chronic, or Slow-to-Recover Patients with Low Back Pain Unimproved or Slow-to-Improve (Symptoms >4 Weeks)
- Surgical Considerations for Patients with Anatomic and Physiologic Evidence of Nerve Root Compression and Persistent Low Back Symptoms
- Further Management of Subacute Low Back Pain
- Further Management of Chronic Low Back Pain

Scope

Disease/Condition(s)

Low back disorders

Guideline Category

Diagnosis

Evaluation

Management

Rehabilitation

Treatment

Clinical Specialty

Family Practice

Internal Medicine

Orthopedic Surgery

Physical Medicine and Rehabilitation

Preventive Medicine

Surgery

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Occupational Therapists

Physical Therapists

Physician Assistants

Physicians

Utilization Management

Guideline Objective(s)

- To describe evidence-based best practices for key areas of occupational medical care and disability management
- To improve or restore the health of workers with occupationally related illnesses or injuries
- To improve the quality of occupational medical care and disability management

Target Population

Adults with potentially work-related low back disorders seen in primary care settings

Interventions and Practices Considered

Diagnosis/Evaluation

1. X-ray
2. Magnetic resonance imaging (MRI)
3. Computerized tomography (CT)
4. Myelography
5. Electromyography

Management/Treatment

1. Activity modification/exercise

- Alteration of sleep posture
- Exercise (aerobic exercise, stretching exercise, strengthening exercise, trial of aquatic therapy)
- Work conditioning and work hardening
- Bed rest

2. Behavioral methods
   - Fear avoidance belief training
   - Cognitive behavioral therapy
   - Psychological evaluation
3. Medication
   - Nonsteroidal anti-inflammatory drugs (NSAIDs)
   - Cytoprotective drugs (proton pump inhibitors, misoprostol, sucralfate, and H2 blockers)
   - Acetaminophen
   - Aspirin
   - Opioids (limited use, with screening for substance abuse)
   - Muscle relaxants
   - Capsaicin
   - Norepinephrine reuptake inhibitors
   - Topiramate
   - Gabapentin
   - Lidocaine patches
   - Carbamazepine
   - Glucocorticosteroids
4. Physical methods
   - Massage
   - Manipulation or mobilization of the spine
   - Low-tech cryotherapies
   - Heat therapy, including a heat wrap
   - Infrared therapy in conjunction with exercise program
   - Yoga
   - Shoe lifts and insoles
   - Transcutaneous electrical nerve stimulation (TENS)
   - Acupuncture
   - Neuroreflexotherapy
5. Trigger and/or tender point injections
6. Chronic pain management/functional restoration program
7. Participatory ergonomics program
8. Patient education: back schools or education
9. Biofeedback
10. Surgical therapy
    - Lumbar discectomy
    - Spinal fusion
    - Decompression surgery
11. Smoking cessation
12. Weight loss

Major Outcomes Considered

- Time to return to work
- Symptom relief

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

The following databases were searched from 1966 to 2010:

- The National Library of Medicine's MEDLARS database (Medline) (www.nlm.nih.gov)
- EBM Online (www.bmjjournals.com)
- The Cochrane Central Register of Controlled Trials (http://www.thecochranelibrary.com/view/0/index.html)
- TRIP Database (www.tripdatabase.com)
- CINAHL (nursing, allied health, physical therapy, occupational therapy, social services: http://www.cinahl.com/wpages/login.htm)
- EMBASE (www.embase.com/)
- PEDro (www.pedro.fhs.usyd.edu.au/)

Ranking and Preliminary Screening of Studies

Primary sources selected for inclusion in the evidence base for American College of Occupational and Environmental Medicine (ACOEM) products and services are limited to those with the strongest apparent study design, pending quality rating. The strength and quality of study design are determined by ranking and rating of the studies according to accepted methods. Generally accepted ranking of study design for diagnostic testing and clinical treatment methods were modified by the Guideline Methodology Committee (GMC). Systematic reviews in general are not ranked as the best design in reality, as most reviews located during pilot testing of the Methodology, with the exception of many (but not all) Cochrane reviews, did not use systematic searches or quality assessments of included studies. The GMC also excluded level 4 evidence from consideration (case series, poor-quality cohort studies, poor-quality case-control studies, expert opinion without explicit critical appraisal, and expert opinion based on physiology, bench research, first principles). The focus was on the best-designed original studies, pending quality grading. For example, studies of diagnostic tests are generally limited to those compared to an acceptable gold standard, and those reporting sensitivity and specificity. Studies of clinical treatment methods are generally limited to randomized controlled trials or crossover trials. Additional literature was also reviewed when there was a paucity of higher-grade literature or if it was brought to Evidence-based Practice Panel's (EBPP's) attention from interested parties.

To narrow the data discovered in the search to that which will be acceptable for further analysis and quality rating, researchers use additional preliminary screening criteria for original research.

Criteria for Inclusion in Study Rating and Critical Analysis of Studies of Diagnosis/Clinical Assessment Methods

1. Evaluate the efficacy (i.e., clinical accuracy) of the assessment method (i.e., the "test") in a group that contains subjects both with and without the condition the test is intended to assess.
2. Be a prospective cohort study or an arm of an randomized controlled trial (RCT).
3. Compare the findings of the assessment method (test) to an adequate reference standard for all subjects (not just subjects who tested positive).

Criteria for Inclusion in Study Rating and Critical Analysis of Studies of Treatment Efficacy

1. Evaluate a group of subjects with a representative spectrum of the clinical condition of interest.
2. Be a randomized controlled trial evaluating clinical outcomes in a group receiving the intervention compared to a comparison group receiving either no intervention or a different intervention.
3. Evaluate functional outcomes that are important to a patient's overall health or well being or are important to society.

Searches are documented, listing the database searched, the search terms, article type and limits, the time frame searched (in this case, all years in the databases), the number of studies found, the number reviewed in detail, and the number included in the systematic analysis. Despite multiple database searches, many additional studies are discovered in exhaustive manual searches of article reference lists.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Strength of Evidence Ratings

A = Strong evidence-base: Two or more high-quality studies.*

B = Moderate evidence-base: At least one high-quality study or multiple moderate-quality studies** relevant to the topic and the working population.

C = Limited evidence-base: At least one study of moderate quality.

I = Insufficient evidence: Evidence is insufficient or irreconcilable.

*For therapy and prevention, randomized controlled trials (RCTs) or crossover trials with narrow confidence intervals and minimal heterogeneity. For diagnosis and screening, cross sectional studies using independent gold standards. For prognosis, etiology or harms, prospective cohort studies with minimal heterogeneity.

**For therapy and prevention, well-conducted cohort studies. For prognosis, etiology or harms, well-conducted retrospective cohort studies or untreated control arms of RCTs.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Study Assessment and Quality Rating

Studies are first abstracted into evidence tables for easier assessment. See Appendix B in the methodology companion (see the "Availability of Companion Documents" field) for a sample of an evidence table for treatment studies. Each study is formally graded for quality using a modification of the most recent assessment scheme proposed by the Cochrane Collaboration Back Group, as shown in the table below. The studies are quality rated using a 0, 0.5, 1 grade for each item, where 0 = does not fulfill the requirement; 0.5 = partially fulfills the requirement and 1 = entirely fulfills the requirement. A study with a score less than 4.0 is rated as a poor-quality study; a study with a score between 4.0 and 7.5 is rated as a moderate-quality study. A study with a score of 8.0 or greater is rated as a high-quality study.

Rating Criteria for Randomized Controlled Trials of Treatment Studies

Criterion	Description
Randomization	Assessment of the degree that randomization was both reported to have been performed and successfully achieved through analyses of comparisons of variables between the treatment and control groups
Treatment allocation concealed	Concealment of the allocation of patients to various arms of the study from all involved, including patients, clinicians, and researchers
Baseline comparability	Measures how comparable the baseline groups are (e.g., age, gender, prior treatment)

Criterion	Description
Patient blinded	The patient is not aware which group he or she is in
Provider blinded	The provider is not aware which treatment he or she is delivering
Assessor blinded	The researcher is not aware which group the results apply to
Co-interventions avoided	The degree to which the study design avoided multiple interventions at the same time
Compliance acceptable	Measures the degree of noncompliance with the treatment protocol
Dropout rate	Measures the dropout rate at different periods of time
Timing of assessments	Assessments and reassessments should be performed at the same time from inception for all study groups
Analyzed by intention to treat	Whether the study data was analyzed with an "intention to treat" analysis

Methods Used to Formulate the Recommendations

Expert Consensus

Expert Consensus (Nominal Group Technique)

Description of Methods Used to Formulate the Recommendations

Each recommendation includes citations of the specific scientific literature which supports the recommendation. The recommendations explicitly consider the health benefits, side effects, and risks of the proposed recommendation. Recommendations include the data elements described below.

Content of Recommendations for Diagnostic Testing or Treatment

1. The diagnoses for which the test or treatment is indicated
2. The specific indications for the test or treatment
3. The point in the time course of the problem for which it is appropriate
4. Prior conservative treatment that should be tried first
5. Relative and absolute contraindications to the test or procedure
6. The number of tests or procedures that are appropriate at a given time in the course of the problem
7. The potential benefits of the test or procedure
8. The potential harms, including effects on disability and return to work

The Evidence-based Practice Panels (EBPPs) for each topic area review and discuss draft practice recommendations from the research staff that includes a review of the quality evidence, evidence tables, and summaries. The strength of evidence rating is confirmed by the EBPP responsible for the topic, with review by the Guideline Methodology Committee (GMC). EBPP members may present additional comments related to their clinical opinions and experience for panel consideration. If a unanimous decision is not possible, an EBPP may vote on the rating of the strength of the evidence to determine a consensus. Dissenters to the consensus may draft minority opinions about the strength of evidence. In practice, this has not happened as recommendations have been unanimous.

Formulation of recommendations requires clinical judgment as well as a full evaluation and consideration of the available high-quality evidence. To aid in framing recommendations, the GMC developed a list of "First Principles" based on the Hippocratic Oath ("First Do No Harm"), medical logic, appropriate sequencing and case management, shared decision-making, support of functional recovery, and relative cost-effectiveness. The First Principles are defined in Table 7 in the methodology companion (see the "Availability of Companion Documents" field). When there is insufficient high-quality evidence of effectiveness or efficacy, or the high-quality evidence is conflicting, and to guide recommendations for alternative tests or treatments when there are several options, these principles are used to guide group decision-making.

The EBPPs then assign a Strength of Recommendation to each recommendation. If a consensus cannot be reached on the recommendation or strength of recommendation, the EBPPs may use nominal group voting if agreement is not possible in the discussion. Once a consensus is reached,

the EBPPs will finalize the language and strength rating of the recommendation. If needed and material, a minority opinion can be appended to the recommendation.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendations

Recommendation	Evidence Rating	Description of Category
Strongly Recommended	A	The intervention is strongly recommended for appropriate patients. The intervention improves important health and functional outcomes based on high quality evidence, and the Evidence-Based Practice Panel (EBPP) concludes that benefits substantially outweigh harms and costs.
Moderately Recommended	B	The intervention is recommended for appropriate patients. The intervention improves important health and functional outcomes based on intermediate quality evidence that benefits substantially outweigh harms and costs.
Recommended	C	The intervention is recommended for appropriate patients. There is limited evidence that the intervention may improve important health and functional benefits.
Insufficient - Recommended (Consensus-based)	I	The intervention is recommended for appropriate patients and has nominal costs and essentially no potential for harm. The EBPP feels that the intervention constitutes best medical practice to acquire or provide information in order to best diagnose and treat a health condition and restore function in an expeditious manner. The EBPP believes based on the body of evidence, first principles, or collective experience that patients are best served by these practices, although the evidence is insufficient for an evidence-based recommendation.
Insufficient - No Recommendation (Consensus-based)	I	The evidence is insufficient to recommend for or against routinely providing the intervention. The EBPP makes no recommendation. Evidence that the intervention is effective is lacking, of poor quality, or conflicting and the balance of benefits, harms, and costs cannot be determined.
Insufficient - Not Recommended (Consensus-based)	I	The evidence is insufficient for an evidence-based recommendation. The intervention is not recommended for appropriate patients because of high costs or high potential for harm to the patient.
Not Recommended	C	Recommendation against routinely providing the intervention. The EBPP found at least intermediate evidence that harms and costs exceed benefits based on limited evidence.
Moderately Not Recommended	B	Recommendation against routinely providing the intervention to eligible patients. The EBPP found at least intermediate evidence that the intervention is ineffective, or that harms or costs outweigh benefits.
Strongly Not Recommended	A	Strong recommendation against providing the intervention to eligible patients. The EBPP found high quality evidence that the intervention is ineffective, or that harms or costs outweigh benefits.

Cost Analysis

Published cost analyses were reviewed.

Method of Guideline Validation

Clinical Validation-Pilot Testing

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Internal Quality Review

The Guideline Methodology Committee (GMC) assigns a committee member to each Evidence Based Practice Panel (EBPP) as a methodology consultant to assist with adherence to this methodology. The GMC reviews all recommendations for which there are questions about consistency with the defined methodology. If the GMC determines that the approved methodology has not been followed, leading to illogical or untenable recommendations, the GMC engages in direct discussions with the EBPP to reach agreement on revision. If there is no agreement or revision, then the matter will be considered by the American College of Occupational and Environmental Medicine (ACOEM) Board of Directors when the document is submitted for Board review.

External Review

ACOEM conducts external peer review of the ACOEM Occupational Medicine Practice Guidelines (APGs) and periodic revisions to 1) assure that all relevant high-quality scientific literature has been found, 2) assure that the important evidence from the relevant scientific literature relevant has been accurately interpreted, 3) solicit opinions on whether the findings and recommendation statements are appropriate and consistent with the evidence, and 4) obtain general information on the conclusions and presentation of materials from external topic experts. Professional and patient organizations, as well as panel members, ACOEM Board of Directors, etc., are invited to nominate external peer reviewers.

Peer reviewers are asked to comment on the completeness of the scientific literature evaluation in their topic area, the clarity and technical accuracy of the APGs evaluation and summary of the evidence, and the appropriateness of the Guideline findings and recommendation statements.

Stakeholder Input

In a cyclical manner, ACOEM will seek stakeholder input to understand the needs and preferences of those who may utilize or be affected by the use of clinical practice guidelines in workplace settings and in the workers' compensation system. ACOEM solicits input from clinicians, health care systems, workers or patients, employers, utilization reviewers, case managers, insurers and third party administrators, attorneys, regulators, and policy makers through a variety of mechanisms. Stakeholders will be asked for comments about their experience using existing clinical practice guidelines and related products and their suggestions for future improvements. They are also asked for input on the use of clinical practice guidelines in clinical care, case management, claim administration, claim adjudication, and in the development of policies and regulations.

To ensure editorial independence in the development process, the stakeholder groups will be asked for input about the APGs, but will not be informed of panel deliberations or shown drafts of practice recommendations before the formal release of the documents. In some cases, a member of a stakeholder group may participate as a member of a Guideline EBPP or may participate in peer review or pilot testing. However, all individuals involved in the APGs development, peer review, and pilot testing are asked to keep all information about the panel's deliberations and conclusions confidential until the APGs are formally released.

Pilot Testing

The guidelines are pilot tested to determine if the recommendations are clear, easy to use, and are generally useful. Pilot testers are not asked if they think the recommendations or process for development was appropriate.

Review by the GMC and the ACOEM Board of Directors

During the entire evidence-based product development process, the GMC will work with the Panels, editors, and research staff to ensure that the evidence-based product methodology is being followed, both in the literature evaluation process and development of conclusion and recommendation statements. The Board of Directors has an opportunity to comment on the Guidelines during the external review period. Their comments are reviewed by the Panel and any necessary changes are made to the Guidelines.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Improved efficiency of the diagnostic process
Effective treatment resulting in symptom alleviation and cure

Potential Harms

- False-positive or false-negative diagnostic tests
- Risks and complications of surgical procedures and imaging studies (e.g., infection, radiation)
- Adverse effects of medications
- Careful monitoring of employed patients taking topiramate or gabapentin is indicated due in part to elevated risks for central nervous system (CNS) sedating adverse effects.
- Muscle relaxants produce symptoms of CNS sedation or depression, thus significantly limiting their utility. The consequent limitations imposed are particularly pertinent for patients who drive, operate machinery, or are otherwise engaged in safety-sensitive positions (crane operators, scaffolding climbers, roofing, air traffic controllers, operators of motorized vehicles, construction workers, etc.).
- There are significant, potentially serious adverse effects with opioids, including tolerance, dependence, and addiction, which can lead to abuse. Also, male sexual problems have been reported, including hypogonadism in those consuming sustained-action oral opioids. Pathoanatomic, social, and emotional factors are thought to contribute to all back pain syndromes, and physicians must be cognizant of the potential interactions between these medications and the psychological components of low back pain (LBP). Perhaps most concerning are recent reports of starkly elevated death rates in association with use of opioids that exceed motor vehicle crash statistics in several states.
- Adverse effects of glucocorticosteroids, including avascular necrosis particularly from long-term administration, are significant and the benefits must be carefully weighed against these risks. Diabetic patients may have worsened glucose control while using glucocorticoids.
- Manipulation is not without risks. However, reported fatal outcomes have occurred from *cervical* not lumbar manipulation. Adverse effects include vertebrobasilar accidents and disc herniation or progression to cauda equine syndrome.

Contraindications

Contraindications

- Implanted metallic-ferrous device and significant claustrophobia are contraindications for magnetic resonance imaging (MRI).
- Nonsteroidal anti-inflammatory drugs (NSAIDs) may be contraindicated in some patients with a history of gastrointestinal bleeding or past history of peptic ulcer disease.

Qualifying Statements

Qualifying Statements

The ACOEM provides this segment of guidelines for practitioners and notes that decisions to adopt particular courses of actions must be made by trained practitioners on the basis of the available resources and the particular circumstances presented by the individual patient. Accordingly, the ACOEM disclaims responsibility for any injury or damage resulting from actions taken by practitioners after considering these guidelines.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Mobile Device Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Low back disorders. In: Hegmann KT, editor(s). Occupational medicine practice guidelines. Evaluation and management of common health problems and functional recovery in workers. 3rd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2011. p. 333-796. [1137 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

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American College of Occupational and Environmental Medicine - Medical Specialty Society

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Guideline Committee

Evidence-based Practice Spine Panel

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Research Grants/Other Support—None

Financial/Non-Financial Conflict of Interest—None

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Low back disorders. Occupational medicine practice guidelines: evaluation and management of common health problems and functional recovery in workers. 2nd ed. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2007. 366 p.

Guideline Availability

Electronic copies: To order a subscription to APG-I, the online version of the Guidelines, call 847-818-1800 or visit http://www.acoem.org/apg-i.aspx.

Print copies are available from the American College of Occupational and Environmental Medicine (ACOEM), 25 Northwest Point Boulevard, Suite 700, Elk Grove Village, IL 60007 by calling 847-818-1800 or order online at http://www.acoem.org/PracticeGuidelines.aspx.

Subscriptions to ACOEM's Practice Guidelines App are available for iPhone/iPod and iPad interfaces from the iTunes Web site.

Availability of Companion Documents

The following is available:

- Methodology for the update of the occupational medicine practice guidelines, 2nd edition. Elk Grove Village (IL): American College of Occupational and Environmental Medicine (ACOEM); 2008. Available from the ACOEM Web site.

Patient Resources

None available

NGC Status

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